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10/050,599	01/18/2002	Jong-Dal Hong	43340	4637

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ROYLANCE, ABRAMS, BERDO & GOODMAN, L.L.P.
1300 19TH STREET, N.W.
SUITE 600
WASHINGTON,, DC 20036

EXAMINER

JOLLEY, KIRSTEN

ART UNIT PAPER NUMBER

1762

DATE MAILED: 08/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/050,599

Applicant(s)

HONG ET AL.

Examiner

Kirsten C Jolley

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 June 2004.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-2, 5-9, 12-16 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1, 2, 5-9 and 12-16 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 6/2/04.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. The claim objections and 35 USC 112, 2nd paragraph rejections have been withdrawn in response to Applicant's amendments and arguments.
2. It is noted that the claims are newly rejected over the newly-cited prior art of the IDS filed June 2, 2004, as set forth below.
3. Applicant's arguments filed June 2, 2004 have been fully considered but they are not persuasive.

With respect to the rejections over Decher et al. in view of Chabreck et al., Applicant argues that the absorbed amount of films formed by the spin method are much greater than with the dipping method because adsorption and rearrangement of adsorbed polyelectrolyte chains on the surface and elimination of weakly bound polymer chains from the substrate by the spin process are simultaneously achieved by a high spinning speed in a short time, as demonstrated in Examples 2a, 2b and Comparative Examples 1a and 1b, and in Figures 4a and 4b. The Examiner acknowledges that unexpected results are shown in the Examples and Figures 4a and 4b to overcome the rejections of Decher et al. in view of Chabreck et al. However, it is the Examiner's position that the claims are not currently commensurate in scope with the showing of unexpected results. First, it is noted that the Examples are all performed using polyelectrolyte materials, however the claims are not limited to the types of materials that may be used. There is nothing in the Examples that leads one skilled in the art to believe that *any* material used would achieve the same unexpected results. Second, it is noted that, in the showings of unexpected

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results, only spin speeds of 2000-6000 rpm and spin times of 15 sec are used. However, spin speeds in the range of 500-30,000 rpm and spin times in the range of 4 to 200 seconds are claimed. There is nothing in the Examples demonstrating that the same unexpected results would be achieved using the claimed spin speeds and spin times. Therefore, the claims are not commensurate in scope with the showing of unexpected results. The claims will be allowable over the prior art of Decher et al. in view of Chabreck et al. if a) the claims are amended to be commensurate with the showing; b) more data is provided to demonstrate the claimed endpoints similarly achieve unexpected results; or c) Applicants provide reasoning on the record convincing to the Examiner as to why the entire claimed ranges, including the endpoints, would similarly achieve the unexpected results already demonstrated. (However, it is noted that the claims are also rejected over the newly-cited art, as set forth below.) The claim rejections over Decher et al. in view of Chabreck et al. are maintained for reasons that one would expect equivalent results using spin coating as dipping in the absence of showing of unexpected results commensurate in scope with the claims.

Applicant argues that the Decher et al. process and similar processes without thorough washing after adsorption of the polyelectrolyte layer lead to several problems, including increased surface roughness, yielding poor film quality. It is noted that Decher et al. teaches washing after each application of coating by immersion (col. 11, line 68 to col. 12, line 1). Further, the claims do not require an *extent* to which washing is performed.

Applicant argues that Chabreck et al. teaches away from Applicants' claimed process because Chabreck et al. discloses an immersion process in which a "more

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preferred” dip method is used without a rinsing or drying step between. Applicants also argue that Chabreck et al.’s “shot gun” disclosure of spin coating along with many other alternatives fails to even discuss how one would employ a spin coating process for forming bilayers or how one would rinse between spin coating applications. It is noted that Chabreck et al. is applied for its teaching of applying multilayer polyelectrolyte coatings by spin coating as an equivalent to spin coating; steps of rinsing between coatings are taught by the primary Decher et al. reference. Further, it is acknowledged that Chabreck et al. does not disclose spinning speeds and times. However, it is well known in the spin coating art that spin speeds and times are result-effective variables and are determined through routine experimentation depending upon a number of factors such as desired coating thickness, viscosity of coating material, surface planarity and surface tension of the substrate, etc. With respect to rinsing by spinning, the Examiner notes that the prior art of Ushijima was cited for its teachings that it is well known in the spin coating art to rinse substrates using spin coating techniques (see col. 8, lines 23-25 of Ushijima).

Applicants argue that Ushijima is concerned with a method for manufacturing a semiconductor by performing photolithography, and includes forming a target resist film thickness and including a number of steps which have no pertinency to Applicants’ claimed process. It is noted that Ushijima is cited merely for its teaching of the conventionality of rinsing substrates by spin coating techniques, as asserted by the Examiner.

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4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 15 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 15 appears to be new matter because while the substrate generally discloses repeating rinsing 0-3 times in the specification, however the specification does not specifically states repeating rinsing twice. While an endpoint of a range may be specifically claimed, it is not permissible U.S. practice to claim a midpoint of a range not specifically set forth in the specification. It is noted that the Examples in the specification disclose rinsing twice, however this is equivalent to rinsing a first time as claimed in independent claim 1 followed by repeating rinsing once. The Examiner questions whether Applicants meant to claim that --washing steps are performed twice between coating steps-- instead of "washing steps are repeated twice between coating steps". If Applicant can locate disclosure of this limitation in the specification, then the Examiner will withdraw the rejection.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

7. Claims 1-2, 5-9, 12-14, and 16 are rejected under 35 U.S.C. 102(a) as being anticipated by Jinhan Cho, Kookheon Char, Jong-Dal Hong, and Ki-Bong Lee's "Fabrication of Highly Ordered Multilayer Films Using a Spin Self-Assembly Method," hereinafter "Cho et al."

It is noted that the Cho et al. reference was published on July 18, 2001 which precedes Applicants' filing date. Cho et al. discloses the claimed process in its "Experimental" section on page 1078. Cho et al. discloses: pre-treating the substrate such that it is negatively charged; followed by dropping a material A on the substrate and spinning at 4000 rpm for 8-15 sec; followed by dropping a material B on the substrate and spinning at 4000 rpm for 8-15 sec; and dropping deionized water twice and spinning at the same speed and time in between coating layers. Cho et al. teaches forming 30 bilayers.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cho et al.

Cho et al. discloses rinsing twice between coating layers, instead of rinsing three times (the original step plus repeating twice). It would have been obvious to one having

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ordinary skill in the art to have rinsed the substrate three times instead of two in order to ensure that the substrate is adequately rinsed.

10. Claims 1-2, 5-9, and 12-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Decher et al. (US 5,208,111) in view of Chabreck et al. (US 6,589,665) alone, or over Decher et al. in view of Chabreck et al. and Ushijima (US 5,393,624).

The claims are rejected for the same reasons discussed in the prior Office action, as well as for the reasons discussed above in section 2. As to new claim 16, Decher et al. teaches rinsing in water in Example 11 between coating steps. It would have been obvious to an ordinary artisan skilled in the art to have used deionized water so as to not introduce any impurities into the coatings. As to new claim 15, Decher et al. teaches rinsing three times between coating which meets the limitation of claim 15 (an original washing step which is then repeated twice).

11. Claims 1-2, 5-9, and 12-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stephan T. Dubas and Joseph B. Schlenoff's "Factors Controlling the Growth of Polyelectrolyte Multilayers," hereinafter "Dubas et al."

It is noted that the Dubas et al. reference was published in 1999 which precedes Applicants' filing date by more than a year. Dubas et al. discloses in its "Experimental Section" on pages 8153-8154 a process comprising: pre-treating the substrate with a solution of H₂O₂/ammonia/water such that it is inherently negatively charged (as taught in the instant specification - page 10, lines 20-22); dropping material A at 600 rpm for 5

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min (300 sec) (see description under Figure 1); dropping material B at 600 rpm for 300 sec; and dropping deionized water to rinse the coated layers three times between dropping coating layers at the same speed and time using a robotic platform. Dubas et al. discloses coating up to 30 layers.

It is noted that in Dubas et al. experiments, the materials A and B are dropped for 300 sec at a speed of 600 rpm, and that the spin time is outside the claimed range. The speeds and times of Dubas et al. are merely exemplary and are not limiting. It is known that the spin speed and spin time are directly related and are result-effective variables. It is well known in the art to vary the spin speed and/or spin time as a matter of routine experimentation depending upon a number of factors such as desired coating thickness, viscosity of coating material, surface planarity and surface tension of the substrate, etc.

Further, with respect to claim 8, Dubas et al. teaches spin speeds of 50-2000 rpm. Overlapping ranges are *prima facie* evidence of obviousness. It would have been obvious to one having ordinary skill in the art to have selected the portion of Dubas et al.'s spin speed range that corresponds to the claimed range. *In re Malagari*, 184 USPQ 549 (CCPA 1974).

Conclusion

12. Applicant's submission of an information disclosure statement under 37 CFR 1.97(c) with the fee set forth in 37 CFR 1.17(p) on June 2, 2004 prompted the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 609(B)(2)(i). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kirsten C Jolley whose telephone number is 571-272-1421. The examiner can normally be reached on Monday to Thursday and every other Friday.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P Beck can be reached on 571-272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Kirsten C Jolley
Patent Examiner
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kcj